## REMARKS

Claims 37-44 are pending. Claims 1-36 have been canceled, and new claims 37-44 have been added. Therefore, claims 37-44 are pending. Applicant respectfully requests reconsideration of the claims in view of the above amendments and the following remarks.

The Office Action of May 2, 2011 required Applicants to elect a single invention as between Group I [claims 1-29 and 34-36] and Group II [claims 30-33], and if electing Group I, to further elect a single species from among the species identified in the Office Action.

Applicants hereby elect Group I, and further elect the species identified by the Office Action as the "Species of Figures 1-2 in combination with Figures 41-42." Applicants have cancelled all original claims, and added new claims 37-44 that cover a method of operating an internal combustion engine as taught by Figs. 1 and 2, and Figs. 41 and 42, and the text of the application (references to text herein will be to paragraphs of the published PCT application, WO 2005/071230, unless otherwise noted).

For ease of reference, Applicants note that Fig. 1 and its related text teach an engine cycle known as the "High Efficiency Hybrid Cycle" (or "HEHC;" see paragraph 23). An engine that executes the HEHC cycle is called an HCCE engine ("We will describe in more detail below engines that implement HEHC and we will call such engines "Hybrid Cycle Combustion Engine", or HCCE;" paragraph 25).

Figs. 41 and 42, and the accompanying text, teach an embodiment of an HEHC engine that executes the HEHC cycle (beginning at paragraph 151; "an embodiment that enables HCCE to execute the required cycle"). Therefore, the embodiment of Figs. 41 and 42 implement the HEHC cycle, as described more fully below.

The claims herein are well supported by the application. In particular, the limitation in the first subparagraph of claim 37, namely "providing, in a housing, a piston and a shaft, wherein over a course of rotation of the shaft there are successively defined volumes in differing amounts within the housing for phases of compression, combustion, and expansion," is supported by Figs. 41 and 42 and related text.

More specifically, the engine of Figs. 41 and 42 includes a housing, pistons and a shaft, as well as "intake and exhaust ports and fuel port" (paragraph 152). As the shaft rotates, there are successively defined volumes in differing amounts within the housing for phases of compression, combustion, and expansion, as there must be in order to execute the HEHC cycle (see, for example, the varying volume shown in Fig. 1).

The limitations of the second, third and fourth subparagraphs of claim 37 are supported by the discussion of Figs. 41-42, and the HEHC cycle of Fig. 1 and the engine of Fig. 2.

With respect to the second subparagraph of claim 37 ("causing compression of a working medium, introduced through an intake port, by reducing volume in the compression phase from an initial volume to a second volume that is less than the initial volume;"), in operation "Air is compressed into a compression chamber…" (paragraph 152, and see also paragraph 21-38 for further discussion of Figs. 1 and 2). The very act of compression means that the compressed volume is less than the initial volume.

With respect to the third subparagraph of claim 37 ("causing combustion, in the combustion phase, while maintaining substantially constant volume, of fuel that has been introduced through a fuel port into the working medium"), paragraph 152 specifies that, after the compression, "fuel is then injected or introduced into it and combustion begins and proceeds to completion." Combustion is caused by introduction of the fuel, because (as noted in paragraph 26) the working medium is compressed to a point "above the pressure-temperature conditions that would cause auto-ignition were fuel present."

Further, the combustion occurs at a substantially constant volume because, as per the description of the HEHC cycle being executed by the engine, "the fuel combusts at substantially constant volume conditions" (paragraph 26).

With respect to the fourth subparagraph of claim 37 ("undergoing expansion, in the expansion phase, of gases from combustion while the volume increases to a third volume that is larger than the initial volume"), paragraph 152 specifies that "When combustion is completed under constant volume, the expansion cycle begins." As per the description of the HEHC cycle performed by the engine, the expansion volume is larger than the initial volume (paragraph 31; "configuring the expansion stoke to provide a volume that is significantly larger than the volume provided during the intake stroke;"

similarly, "an expansion chamber that has a larger volume than the chamber used for the compression stroke.")

Finally, support for the limitation in the last subparagraph of claim 37 is found in Figs. 41 and 42. An examination of the embodiment in Figs. 41 and 42 reveals its operation without valves between the various chambers, so that the volume varies, if at all, over the course of shaft rotation in a manner that is smooth and continuous.

Support for claim 38 is found in paragraph 18 ("The working medium may be air or a noncombustible mixture of air and fuel medium.")

Support for claim 39 is found in paragraph 26 ("fuel is added only after the compression phase is substantially compete").

Support for claim 40 is found in paragraph 26 because (as noted above) the "pressure-temperature conditions" are such as to cause "auto ignition."

Support for claim 41 is found in paragraph 35 and Fig. 2 ("Energy Recovery System (ERS), 200"), and the description of the Energy Recovery System beginning at page 46 (the ERS "converts raw fuel . . . into . . . other gases which have up to 27% higher heat of combustion.")

Support for claim 42 is found in paragraph 32 ("reduce the temperature of the exhaust gases").

Support for claim 43 is found in paragraph 32 ("In this embodiment, the heat recovered from the water may be used to cause thermo-chemical decomposition of incoming gaseous fuel. . . .").

Support for claim 44 is found in paragraph 46 ("The conversion occurs in a thermo-chemical recuperator via endothermic, catalyst-assisted reactions occurring at a constant temperature between 450 and 750 deg. C.")

All pending claims are believed to be in a form suitable for allowance. Therefore, the application is believed to be in a condition for allowance. The Applicant respectfully requests early allowance of the application. The Applicant requests that the Examiner contact the undersigned, Thomas J. Tuytschaevers, if it will assist further examination of this application.

Applicant does not believe any extension of time is required for timely consideration of this response. In the event that an extension has been overlooked, this

conditional petition of extension is hereby submitted. Applicant requests that deposit account number 19-4972 be charged for any fees that may be required for the timely consideration of this application.

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Respectfully submitted,

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